HOUSE OF COMMONS SESSION 1999–2000

SCIENCE AND TECHNOLOGY COMMITTEE

THE GOVERNMENT'S EXPENDITURE ON RESEARCH AND DEVELOPMENT: FORWARD LOOK 1999

MINUTES OF EVIDENCE

Wednesday 2 February 2000

SAVE BRITISH SCIENCE
Dr Peter Cotgreave and Professor Peter Saunders

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
Dr David Shannon and Dr Anthony Burne

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MINUTES OF EVIDENCE

TAKEN BEFORE THE SCIENCE AND TECHNOLOGY COMMITTEE

WEDNESDAY 2 FEBRUARY 2000

Members present:

Dr Michael Clark, in the Chair

Mr Nigel Beard	Dr Ian Gibson
Mrs Claire Curtis-Thomas	Dr Desmond Turner

Memorandum submitted by the Save British Science Society

WORLD CLASS INVESTMENT IN WORLD CLASS SCIENCE

1. SBS is pleased to submit evidence to this inquiry, and congratulates the Committee on choosing to examine an issue of such importance to the economic well-being and quality of life of the UK's citizens.

EXPENDITURE & INVESTMENT

2. SBS believes that it is inappropriate to refer to public money used for scientific research and development as expenditure.

3. The Government has recognised in its 1998 White Paper *Our Competitive Future*[1] that future job creation and economic well-being will depend on the "knowledge-driven economy", based on scientific research. Thus, it is more appropriate to view money used in the creation of that knowledge as investment than as expenditure.

TRENDS IN RESEARCH BUDGETS

(a) *Overall trends*

4. Over the current Parliament, overall investment in civil research and development outside the science base will fall by 8.6 per cent in real terms.[2] It is difficult to square this fact with the Chancellor of the Exchequer's assertion that he wants Government policy to be "pro-science".[3]

5. In 2001–02, overall levels of Government investment in research and development will be roughly 17 per cent lower than they were in 1981.[4]

6. The effects of this prolonged lack of investment in science are clear. Between 1940 and 1980, scientists working in UK laboratories won an average of one scientific Nobel Prize per year.[5] The 1980s and 1990s have been the two worst decades since 1940 for such achievement, with our success rates falling dramatically.

7. Nobel Prizes are, of course, only one measure of scientific success but the UK's falling success rate is indicative of more general concerns that we are falling behind other countries.

8. In the increasingly competitive global economy, the UK must restore the cuts in science funding that have happened over the last two decades, or the jobs, wealth, and benefits to quality of life that might otherwise be created will be lost to other countries.

9. In 1998, SBS called for Government funding of UK science to double in real terms over the next decade.[6] We therefore strongly support the principal aims of the National Science Strategy Bill that was given a first reading in the House of Commons on 9 November 1999.[7]

(b) *Trends in the Science and Engineering Base*

10. SBS has welcomed wholeheartedly the planned increases in funding for the science base that have followed from the Comprehensive Spending Review.[8] At the end of this Parliament, total Government investment in R&D in the science base will be 12.5 per cent greater than it was in the last year of the last Parliament.[2]

11. However, SBS would add two caveats:

Balance between different funding routes

12. The balance between Research Council and Funding Council funding has been significantly altered over the past decade or more, with some unwelcome consequences.

13. In 1986–87, 56 per cent of Government investment in the science base came via the predecessors of the Higher Education Funding Councils. This has now fallen to 45 per cent and is set to fall very slightly by 2001–02.[2]

14. The effects of this shift are to squeeze the freedom for universities to carry out research "at the institutions' discretion" that was specifically given to the universities by the 1993 White Paper *Realising Our Potential*.[9]

15. Such funds are important for investing in potential success by, for example, starting up a project for a young researcher with an idea that may develop into impressive and innovative science, but which is sufficiently new and untested that a Research Council grant is unlikely to be awarded to someone without an existing reputation.

16. SBS recently heard from an eminent scientist engaged in pharmaceutical research within a university who believes that, under current mechanisms, it would be impossible for him to start out to create the outstanding team that he has created over the past 30 years.

17. In addition, the proliferation of "challenges" in the system of science funding creates additional burdens on institutions in terms of the resources needed for the preparation of high-quality applications.

18. Schemes such as the Science Enterprise Challenge,[10] the Higher Education Reach Out Fund,[11] and University Challenge[12] have highly desirable aims, and the money allocated to them is welcome, particularly when, as in this year's Budget, real new money is found to expand on the innovative ideas. Nevertheless, SBS believes that the extra effort involved in applying takes time and other resources that might better be used in carrying out the universities' main business—teaching and research.

19. This problem is particularly severe because the proportion of total available money that is channelled through such challenges is generally small, so the success rate is inevitably low, however many excellent applications are submitted.

20. We believe that innovation and enterprise should be stimulated as these schemes aim to do, but we would hope that the level of investment would increase (without taking funds from the two main legs of the dual support system), and that the mechanisms for allocating the funds might be altered, perhaps to reward track record rather than constantly requiring new and different application procedures.

International Comparisons

21. Any sensible assessment of the strength of investment in the UK science base must be made in the context of international comparisons. Figures from the OECD show that in 1996, the last year for which data are available, the UK invested less in university research and development than any of the five other G7 countries that report statistics in the same way.[13]

22. Government investment in university research per head of the workforce was $170 in Germany, $165 in France, $155 in the USA, $117 in Italy, $104 in Canada and $101 in the UK.

23. Moreover, recent announcements by the legislatures and Governments of many of a number of these countries show that they are intending to increase their public investment in university research.[14]

(c) *Trends in departmental budgets*

24. Some of the trends in departmental science investment outside the science base are disturbing.

25. The table below shows the changes in research and development budgets (in real terms) over the period 1986–87 to 1997–98, and over the current Parliament (1997–98 to 2001–02) for the six departments with the largest research budgets, as reported in the *Forward Look 1999*.

Department	*Change in R&D budget 1986–87 to 1997–98*	*Change in R&D budget over current Parliament*
DTI	-29.5%	-16.1%
MAFF	-26.4%	-10.3%
DETR	-1.6%	+0.9%
DfID	+157.7%	-6.3%
DfEE	-40.4%	+51.9%
Scottish Office	-21.6%	-3.8%

26. Two clear messages stand out from these figures.

— Apart from the Department for International Development, research budgets had been cut dramatically in the decade or more preceding the start of the current Parliament in 1997, with four of the six largest research investors receiving cuts of more than 20 per cent.

— Apart from a small (less than 1 per cent) increase in research investment at the Department of the Environment, Transport and the Regions, the Department for Education & Employment is the only one of the major research investors whose research budget will not be cut over the period of the current Parliament.

Department of Trade and Industry

27. A further worry surrounds the figures for the Department of Trade & Industry. The figures quoted in the table refer to research investment excluding the effects of the Launch Aid scheme. This scheme now generates income for the DTI, and when its effects are taken into account, it is clear that real investment is lower than would appear from the raw figures.

28. Research and development in the area of industrial activity is extremely important to the UK's economy, and it is worrying to see such a dramatic drop in this area, particularly in the light of the lack of industrial investment that is evident from R&D Scoreboard.[15]

29. Only one of the world's top 50 corporate research investors is now a UK company, UK industry invests dramatically less than other countries. Weighted for population size, the Netherlands, Canada, France and the USA have four times as many such companies, Germany, Japan and Sweden have more than five times as many, and Switzerland has 25 times as many.

30. Although there can be no proof of a link, it is very likely that British industry's failure to invest properly in research is connected to historic under-investment by the Government. At least two lines of evidence support such an argument.

31. First, the direct testimony of expert economists strongly favours the theory that Governments can set an example that industry will follow. Gary S Becker, who won the 1992 Nobel Prize for Economics believes, for example, that, in the USA, "higher federal funding of basic research . . . usually increases rather than decreases spending by pharmaceutical companies."[16]

32. Second, across the G7 economies there is a statistically significant, positive correlation between the Government's investment in R&D and Business investment in R&D, where both are adjusted for the size of the workforce.[13] Such a correlation should not be over-interpreted, but it is clear that, in modern industrialised nations, insofar as levels of Government investment in R&D have any effect on the private funding needed to boost trade and industry, that effect is positive.

Ministry of Agriculture, Fisheries & Food

33. A whole series of farming and food related problems have been followed by continued and sustained cuts in the Ministry of Agriculture's research budget. Despite problems with, and serious questions about BSE, Salmonella, Listeria, tuberculosis in cattle and wildlife, antibiotic resistance through agricultural use, and management of fisheries' stocks, the MAFF research and development budget has been reduced by 29.7 per cent between 1986–7 and 1999–2000.[2] Further cuts of 6 per cent are planned over the next two years, despite the fact that both the Prime Minister and the Leader of the Opposition have called on the floor of the House of Commons for more research into genetic modification of foods.

Department of the Environment, Transport & the Regions

34. Environmental and transport concerns are crucial to people's quality of life. In recognition of this, the Deputy Prime Minister announced earlier this year that his department (the DETR) would undertake scientific monitoring of some key "quality of life" indicators, such as atmospheric pollution and the strength of wild bird populations.[18]

35. SBS therefore finds it surprising that over the next two years (1999–2000 to 2001–2002) the DETR will experience a 4.6 per cent cut in its research and development budget.

CO-ORDINATION OF SCIENCE POLICY AND FUNDING ISSUES

36. It is plain that the current Chief Scientific Adviser cares passionately about the place of science in good Government, and that he takes seriously his role of co-ordinating departmental decisions on research and development investment.

37. However, it is equally plain that under the current system, the OST is powerless in the face of departments that are under pressure from other sources. For example, the MAFF recently discontinued its Postgraduate Agricultural & Food Studentship Scheme, which was funded via its research budget to train the next generation of agricultural scientists. The Minister of Agriculture has told SBS that the scheme was "highly regarded for both [its] high value research and training".[19]

38. Most important in this context was the Minister's reason for cutting the scheme. It was a " necessary, but unwelcome casualty of a difficult Comprehensive Spending Review outcome for MAFF". Moreover, the reason the Studentship scheme in particular was axed is that "postgraduate training per se is not prominent in [MAFF's] main aims."

39. SBS believes that this comment is, in the abstract, entirely fair. MAFF's duty is not specifically in the training of postgraduate students, which is the function, jointly, of the DfEE and the OST.

40. Crucially, however, co-ordination of scientific matters is sufficiently disparate that it appears that no other department was even asked to take on the role that MAFF was relinquishing. Few people can believe that, even if, say, the DfEE had been requested to fulfil this function, it would have been keen to have done so, given that it must fund properly all of its existing obligations.

Other mechanisms

41. It is apparent from the BSE inquiry that mixing science and politics without clear boundaries is undesirable.[20] Science must operate in the real world, and its conclusions will always be interpreted in a wider context. However, as SBS made clear in its evidence to the Select Committee's inquiry into scientific advice to Government, we think it damaging when scientific results are not just interpreted but reported in an atmosphere of political considerations.[21]

42. To this end, we would favour a system whereby a Ministry of Science was responsible for the oversight of all Government R&D programmes.[22] This would give all Government science the advantage of having been supervised by a Department that had no political axe to grind in any situation without necessarily taking away from other Ministries and Departments the right to define the scientific questions that might be asked.

43. Under such a system, Departments would retain their own R&D budgets, and any Department that perceived a need to carry out a piece of scientific research would be able to do so, commissioning it via the Ministry of Science.

44. A less radical solution would be to alter the remit of the current OST so that it could carry out the potential additional functions of the proposed Ministry of Science. The disadvantage of this course would be that it would not provide for a Cabinet Minister with principal responsibility for science. Under the current system, the Secretary of State for Trade and Industry is responsible for such a plethora of areas that if a particular Trade Secretary chooses to concentrate on other important areas, as the current incumbent has focused strongly on consumer affairs, then the crucial role of science will be inevitably be partially marginalised at Cabinet level. We stress that this is not a criticism of the current Trade Secretary, or of any other individual Minister or former Minister. It is a criticsm of the system.

REPORTING

45. In general, the statistical information in the Forward Look is presented in a clear and helpful format, and is essential for a proper analysis of the Government's investment in research and development.

46. However, there is no justification for presenting only a subset of the data (from 1991 to the present) in graphical form, when the tables report fuller data (from 1986) and when the graph is clearly intended to portray a slightly misleading picture. In the Forward Look 1999, the graph on page v, of net Government investment in science, engineering and the technology purports to show significant increases in Government

investment in science in real terms over the last few years. While these facts are unarguable, there is no mention in this introductory section of the fact that such investment is still lower in real terms than it was in the mid to late 1980s.

47. As regards the timing of the Forward Look, SBS believes that as long as the publication is produced annually, there is little to be said in favour of the publication appearing at any particular time of the year, except that it should not be presented during a Parliamentary recess.

48. In order to allow for the closest realistic scrutiny of the Government's record on science and technology, SBS believes that it would be appropriate for the House of Commons to hold a short debate each year on the contents of the Forward Look. In view of the inevitable pressures on Members of Parliament, it might be appropriate for such a debate to take place on a small but detailed scale, perhaps using the new small debating chamber in the Grand Committe Room.

Notes and References

1. Our Competitive Future: Building the Knowledge Driven Economy, DTI, 1998 [Cm 4176].

2. Forward Look 1999: Government-funded Science, Engineering & Technology, OST, 1999 [Cm 4363]

3. Hansard [House of Commons] 3 November 1998, column 685.

4. The figures over the period 1981–2001 are summarised graphically in *Government Investment Research & Development,* SBS, 1999 [SBS 99/19]

5. A list of Nobel Prize winners can be found at the official website of the Nobel Foundation <www.nobel.se>

6. *A World Class Science & Engineering Base for the 21st Century,* SBS, 1998.

7. *Hansard* [House of Commons] 9 November 1999, column 922.

8. *Modern Public Services for Britain: Investing in Reform,* HM Treasury, 1998 [Cm 4011]

9. *Realising Our Potential: A Strategy for Science, Engineering & Technology,* Cabinet Office, 1993 [Cm 2250]

10. DTI News Release P/99/741

11. joint DTI/DfEE News Release P/99/508

12. see e.g. DTI Press Notice P/98/955

13. OECD Main Science & Technology Indicators and Basic Science & Technology Indicators, 1999 editions.

14. USA: see website of the American Physical Society <www.aps.org>. Germany: *Nature* vol 399, p.186; vol 400, p.11. France and Japan: *Nature,* vol 401, p.313.

15. *UK R&D Scoreboard 1999,* DTI, 1999

16. *Business Week,* 19 April 1999, p.27.

17. *Hansard* [House of Commons] 3 February 1999, column 926.

18. *A Better Quality of Life,* DETR, May 1999.

19. Letter from the Minister of Agriculture to SBS, 7 June 1999.

20. see, e.g., the oral evidence given by the former Chief Medical Officer, Sir Kenneth Calman, on day 66 of the BSE inquiry <www.bse.org>, in which he reported that he "felt that Ministers were not being fully informed" because MAFF officials considered it a "step too far" to include a sentence drafted by Sir Kenneth in a briefing document to the effect that possible lapses in the implementation of regulations could have been "potentially serious".

21. *Scientific Advice to Government: Ensuring Quality and Objectivity,* SBS, 1998.

22. *New Statesman,* Special Edition, 1 May 1999, p.8.

November 1999

Examination of Witnesses

DR PETER COTGREAVE, Director, and PROFESSOR PETER SAUNDERS, Executive Member, the Save British Science Society, were examined.

Chairman

1. Order, order. Thank you very much indeed for coming along this afternoon and assisting the Science and Technology Select Committee in our inquiry into Government Expenditure on Research and Development: The Forward Look 1999. Maybe it would be helpful if each of you would give a brief introduction of yourselves to the Committee and then I shall start the questioning.

(*Dr Cotgreave*) Thank you very much; it is a great pleasure to be able to help you with your inquiry. I am now the full-time Director of The Save British Science Society, but I am by background an ecologist and I formerly worked at the Zoological Society of London and before that I was a lecturer at the University of Oxford. Hopefully I understand both the university system and the other half of the science base in this country.

(*Professor Saunders*) I am on the Executive Committee of Save British Science and edit the newsletter. My day job is that I am Professor of Applied Mathematics at King's College London and I would just point out to the Committee that, despite my accent, I have lived in this country longer than Dr Cotgreave has.

2. Shall we agree that we direct our questions to Dr Cotgreave and if Dr Cotgreave feels he wishes to pass them to Professor Saunders then he does so because we should have one point of reference. In your submission, you rightly make the point that government investment in civil research and development outside the science base is expected to fall over the lifetime of this Parliament. How significant is this when placed in the context of an expected overall increase in civil R&D over the same period due to the bigger increase in the science base through the dual support system?

(*Dr Cotgreave*) That is a very interesting question and none of us really knows the answer to it. The reason we make this distinction between the science base and civil research outside the science base is that they are for different purposes and the half which is being cut, the research in the civil departments outside the science base is there to inform government policymaking on issues such as genetically modified foods or BSE, for example, and that is a different thing from blue skies research in universities which is largely what the science base is for.

3. For the transcript and for public consumption it might be just as well if we agree what we mean by the science base and outside the science base. Inside the science base, we mean science funding within the dual support system.

(*Dr Cotgreave*) Yes.

4. Outside the science base is outside that, which is largely government research within government departments within Whitehall. Are we talking the same terms?

(*Dr Cotgreave*) Yes, we are talking the same language. The bit which is going down is the government research in government laboratories, such as the MAFF laboratories for example, which is there largely to inform government policymaking. That is the bit which is being cut, so it could be very significant that the Ministry of Agriculture, for example, may not be able to perform the research it needs to do to inform itself properly about the genetically modified food problem, for example.

5. Do you think, therefore, that the reduction in spending on R&D outside the science base will not necessarily be compensated for by the increase within the science base? They are two different types of research, are they not?

(*Dr Cotgreave*) We are comparing apples and oranges and there is no way, however much new money is put into the science base, that one could compensate for the other half, which is a different thing.

6. We welcome the increased science base; we are very apprehensive about the reduction in scientific spending within government departments.

(*Dr Cotgreave*) That is true and I should stress that we do welcome the increase in the science base. We are not just bashing the inevitable—

(*Professor Saunders*) While we are all agreed on our definition of the science base, in fact I think you will find, depending on definition, something like four fifths of what you would normally think of as science base is done in the universities, therefore under the dual support system, a lot of the rest of it has been done in government research establishments and as far as I know that is the first bit to go when they start cutting their budgets, in fact there is a direct effect on the science base as well.

7. What implications would it have for the health of the nation if science in the broadest sense—engineering and technology—if all government funding for research and development were delivered via the science budget, in other words the dual support system, and the higher education funding councils?

(*Dr Cotgreave*) Do you mean if all of the bits in the Government science laboratories outside the science base were to be whittled down to nothing?

8. Yes.

(*Dr Cotgreave*) It would be a complete disaster.

Dr Turner

9. This is really a political question, as far as I am concerned, which relates to the position of scientists in the pecking order when it comes to decision making. I do not mean party politics; I mean the sort of inter-departmental type of politics which is much nastier than anything that we do in public. You have a proposal for the creation of a Ministry for Science.

(*Dr Cotgreave*) That is right.

[**Dr Turner** *Cont*]

10. Which would have responsibility for government R&D as well as for the activities of the research councils. In other words, this would give much more prominence and much more clout than the present Minister for Science has. How do you see the relationship between the Ministry for Science and the departments if we had such a system? Where do you think the budget would lie?

(*Dr Cotgreave*) Personally I think that the individual departments would retain their own research budgets as they now have them, although it would be clearer that they had a research budget rather than the situation we have with MAFF at the moment where it has a budget and it is able to whittle down its research budget because there are pressures on other parts of the department. The individual departments would retain their own budgets and would probably retain the right to ask their own questions in that sense, because they control the questions. For example if BSE arose again, it would be for the Ministry of Agriculture to say they want to know whether people can catch CJD from eating infected beef. The oversight of that research and the proper interpretation of those results would be the responsibility of the Ministry for Science and at Cabinet level would be the responsibility of our proposed Cabinet Minister for Science. Then we would not be able to have the situation which occurred with BSE, where the Chief Medical Officer was overruled when he wished to put a statement about the serious potential defects with the removal of specified bovine offals into a document, which was not for public consumption, it was for the Cabinet Committee. The upshot of that was that the Cabinet Ministers, making decisions on our behalf, were not properly informed.

11. You have partially answered the question I was going to ask you next which relates to how effectively money is spent on scientific research and development within government departments. They are not subject to the peer review process that work done through the dual support system is. Do you think there would be a greater cost effectiveness and a greater quality of output if a super Minister for Science were able to exercise that scrutiny?

(*Dr Cotgreave*) Yes, I do think that.

(*Professor Saunders*) The trouble is that there is no peer review or something like it in a ministry. It is always a good idea to have someone from the outside who can see what is going on and comment on it. The other thing is that, as departments do things individually, there is no coordination, there is no way of ensuring the same work is not done twice or, as in other cases, that the same work is done at all. One example, which perhaps is not relevant to this, but illustrates the point I am making about coordination, was when MAFF stopped funding special postgraduate studentships, which was a decision they could take. It was not at all clear who, if anyone, was going to start funding them. These studentships are needed and as far as I know are not being funded. That is the sort of not-joined-up thinking which would be avoided.

12. Although you draw a clear distinction between the type of blue skies research which is funded by the dual support system and more applied science which is funded by the ministries themselves, to order as it were, do you not think there would be an advantage if there were some greater degree of relationship between the two; greater coordination and a grand Ministry for Science could be the vehicle for that. What do you think?

(*Dr Cotgreave*) Yes, that is right. At the moment the Chief Scientific Adviser nominally has that role. The current Chief Scientific Adviser is a very able man, but it is extremely difficult for him to fulfil that role when he is himself placed in the Department of Trade and Industry in the OST and has no clout in MAFF or the DfEE or DETR or any of the other departments.

13. May I go back to your comments about the budget? You assume that science and R&D budgets would stay within the departments. Do you not think it would contribute towards achieving the coordination and the scrutiny, all the things which we agree would be desirable, if the Ministry for Science actually held the budget and departments had to bid to the Minister for Science and therefore go through peer review to justify their bids; and do you not think there would then actually be an incentive for departments to look to spend more on research and development and therefore benefit British science as a whole.

(*Dr Cotgreave*) That is a very interesting proposal. When you asked the question about where the budgets should be, I did say that personally I thought they might be better staying in the individual departments. I know that is not a view which is shared by everybody on the SBS Executive Committee. Some people, possibly even Professor Saunders, I do not know, would agree with your scheme and I certainly would not argue vigorously for mine against yours. Either would be a significant improvement on the current situation.

(*Professor Saunders*) I do not want to get involved in this, except, you must remember that a lot of the science expenditure which goes on in some of these departments is not so much R&D as fairly routine stuff. You always have to remember with peer review that it is yet another set of forms to fill in and can therefore lead to inefficiency all by itself.

14. Yes, I accept that point. How would your suggested reforms affect the research councils? How would they fit into the structure and what effect do you think it would have on programmes currently being carried out in government research institutes, whether departmental ones or research council ones?

(*Dr Cotgreave*) I would hope that it would not have any significant effect on the research councils. I would hope that they would remain as they are to fund the best proposals coming up from the scientific community. The only difference I hope it might make across the board out of this question is that there may be better coordination of the funds which are being used in particular areas. BSE is a case in point where actually over time MAFF and the research councils have developed a scheme for coordinating what they are doing, so that there is no doubling up and so that the bits which are more pure and the bits which are more applied are both done and the bridges between them are noticed. That has happened on an *ad hoc* basis on a particularly serious issue. Under our

[**Dr Turner** *Cont*]

scheme, one would hope that on other issues it would be easier to fulfil that coordination without having to create new and special groups on every occasion.

15. Do you think that your reforms would lead to an improved quality of scientific advice to government?

(*Dr Cotgreave*) Yes.

Dr Gibson

16. Why?

(*Dr Cotgreave*) I will refer back to the example I gave before. In the BSE crisis, the Government, Ministers, Cabinet Ministers, Cabinet Committee responsible for deciding what to do about specified bovine offals were not given the best scientific advice. The Chief Medical Officer said there could potentially be a serious problem and they were not told that, even though his express wish was that they should be told. It is a clear example that under the current system the scientific advice to government was poor and under our system I would hope that that could not happen.

Mr Beard

17. In scientific terms it looks as though Save British Science and Dr Gibson are the last of the big spenders in that both of you have asked for a doubling of government funding for science since 1998. What causes you to arrive at a 100 per cent increase as opposed to a 75 per cent increase or 150 per cent increase? What is the foundation for this sort of budget?

(*Dr Cotgreave*) In the very roughest terms, making allowances for likely increases in the GDP of a group of 16-18 comparable industrialised countries, if our investment in science and technology were to double, we would roughly be average among that group of comparable countries which includes not just Japan, Germany, France and the USA, but also countries like Finland and Iceland; it would make us average if we doubled our budget.

18. Are these the OECD countries?

(*Dr Cotgreave*) Yes, these are the OECD countries; not all of the OECD countries.

19. So you are not taking a view about what science needs to do but a sort of fair shares is right—that if everybody else can do it so should we. That is the basis?

(*Dr Cotgreave*) That is very roughly and very crudely the best estimate we can make. It is very difficult to make an estimate of what is right in the sense that you make, but most people I talk to would agree that what is right is that we should invest rather more than we do at the moment.

20. More specifically, what would the nation gain from this? What would be the benefit to the development of public policy and public procurement which is likely to result from that high increase?

(*Dr Cotgreave*) There is a whole plethora of answers to that; two quite different sets of answers. One is to do with the better quality of advice to government and therefore the better government one would get if one had a broader base of scientific research. It is now generally pretty well accepted that when the BSE crisis came along, for example, we did not really have the spectrum of expertise we needed to do that and we had to move people from other areas. I believe in fact that it is true that the research on scrapie, a similar disease, had in fact been run down earlier and then of course, when the BSE crisis came along, people had to be moved from other things to work on that and that means, if the things they were working on happened to become problems in the next few years, we would not be able to have the expertise to answer those questions. So that is one set of answers. The other set of answers—and to be entirely fair this is now coming through quite strongly from the Government's literature and the Government's consultation papers—is to do with the economic spinoffs from increased investment in science and technology. The economy is changing; it has already changed; we are living in this thing which we call the knowledge economy. None of us really knows what that is but we do know that the only way we are going to succeed in it is by having as many good clever ideas as our competitors in Germany, France and Japan.

21. Do Save British Science have any views as to where this money would go by priority?

(*Professor Saunders*) I have not thought about that in particular, in fact it is almost a policy decision of ours not to because we represent all science. We would find ourselves in an awkward position if we start prioritising. There are two things to do: one is that you look at the areas which are big now and the other is that you look at the areas which are not big now, which covers both. The areas which are big now, information, biotechnology, things like that, are areas where clearly you would expect more expenditure. One of the things we have learned, sometimes the hard way, is that new areas—and I am thinking of information and biotechnology—because there was a time when they were small, become big. I think I could safely say that we hope very much that if this extra investment were to come it would not be focused too sharply on the areas which look big now, because we have to be looking not at how we manage to make a living for the next ten years, but how we continue to make a good living starting ten or 20 years from now when our children and grandchildren are involved.

22. If that sort of money were spent, how would you suggest that the outcome of spending should be monitored or measured?

(*Dr Cotgreave*) In terms of the economic benefits one can measure economic benefits in a whole variety of ways. One could look at the number of jobs created or the increase in GDP and I know that at the moment, as part of the current spending review, the Department of Trade and Industry and the Treasury are looking at ways in which they can measure the increased benefits from the science base. We are talking really now about the science base rather than the civil spending outside the science base. The question is, of course, how one goes about measuring that without creating a whole new burdensome bureaucracy of measurement which is itself wasteful.

[**Mr Beard** *Cont*]
I know that the Treasury and the DTI are looking at that at the moment and I look forward to seeing what measures they come up with.

23. If this were to come about, do you believe that Britain could provide the numbers of good quality scientists and technologists which would be needed?

(*Dr Cotgreave*) Yes, I do. The key words in that question were "high quality". We need to produce high quality scientists and that is a worry which we now have when we speak to people in universities up and down the country. There is a worry about the quality of people who come into the science base and also about the quality of people who stay in the British science base rather than leaving the science base altogether to go and work in the City or leaving this country to go and work in the States. Policies should be focused, in terms of the people in the science base, on maintaining the quality rather than simply worrying about the numbers. It is the high quality ideas and the high quality people in the science base which will generate wealth for the country in the future.

24. What evidence do you have that that could be done, that you could generate sufficient people for this money to be spent usefully?

(*Dr Cotgreave*) One could not possibly have any evidence of that because we are talking about the future. It is clearly true now that there are worries about the quality of people coming into the science base. For example, I would not disagree with somebody who said we should reduce the number of research council studentships which we are going to give, but fund them better so that we can attract some of the better people into it. I would not disagree with that within current expenditure and investment limits. Of course what I really think is that those limits should be raised so that the people who are already there could be paid more. If that is not going to happen, then I—

25. And presumably work twice as hard if you are going to double the budget.

(*Dr Cotgreave*) I think you would find it rather difficult to work twice as hard as most university academics do.

(*Professor Saunders*) If you want some evidence about the ability that we would have to build up the numbers of high quality people—and after all we are only saying it should be built up to the number most other countries have—you only have to look at the graduating class from any science department in this country, at least in a leading university or at PhD students. There was a time when if you had some really good students in your department you expected that they would want to do PhDs. Now they go off to the City—the same is true of people who get PhDs—or other jobs like that. All you have to do is, say, if instead of a small proportion of the very best students in the class going into science a rather large proportion did, I do not think you would have any shortage at all of the high quality people you need.

26. The problem is how you do it.

(*Professor Saunders*) How do you do what?

27. How do you attract the people who might otherwise be attracted by four figure salaries in the City?

(*Professor Saunders*) We do live in a market economy, so pay would have something to do with it. The other thing would simply be the conditions. If you had an atmosphere in which it was clear that there was science funding, that science funding was going to continue and that this was going to be a thriving enterprise, then you would attract more people.

Dr Gibson

28. Do you include women?

(*Professor Saunders*) Of course; I did not say men and I did not mean just men.

29. I know you did not say "men", but I think women need a special situation to be developed to attract them in. Do you agree with that?

(*Professor Saunders*) Yes; that is certainly true, particularly if they want to have families at a reasonable age and still continue their careers.

Mr Beard

30. You have argued from Save British Science that there is a strong correlation between government investment in R&D and business investment in R&D and that the correlation indicates a generally positive effect on industry. What evidence is there to indicate that high levels of government expenditure on R&D are the cause of high levels of investment by the private sector? Are they possibly just the result of a common cause, namely perhaps the buoyancy of the economy?

(*Dr Cotgreave*) We worded the document extremely carefully and we did say about that correlation that it "... should not be over-interpreted" and "... in so far as levels of government investment ... have any effect on private funding ... that effect is positive". We did not state that that is the case. We did also quote from the 1992 Nobel Prizewinner for Economics, Gary Becker, who said that in the USA higher federal funding for basic research usually increases rather than decreases spending by pharmaceutical companies. So the economists believe that to be the case.

31. What, if any, account do you think the Government should take of the trends of R&D investment in industry when they are settling the budget for government sponsored R&D?

(*Dr Cotgreave*) There are two separate issues. The Government needs to take a view about its own R&D budget almost in isolation. It does also need to take account of what is happening and it is true, if one looks for example at the R&D scoreboard, which the Government compiles itself, that on the whole we do rather badly for large companies investing heavily in British science, apart from the pharmaceutical sector. That is worrying and government ought to be worried about it and ought to think about what they might do. We know from comments from people like, for example, Sir Richard Sykes, the current Chairman of Glaxo Wellcome, that part of the reason why companies like his invest heavily in this country is because they believe we have a good science base or have had a good science base from which to draw talented and skilled people. It is very

[**Mr Beard** *Cont*]

clear that those companies think that if the Government were not to invest properly in science and technology, in a global market, they can simply up sticks and go to another country where they do.

32. Excuse me, that was not the question. The question was: if, for instance, as is the case from the R&D scoreboard, industrial R&D is not keeping up with the general trend—outside pharmaceuticals I accept—of R&D investments in the sort of countries you are talking about, do you think that should be taken account of in settling government spending on R&D?

(*Dr Cotgreave*) Yes, I think that ought probably to encourage the Government to invest more in R&D in order to increase and boost our science base so that some of those companies which are currently based in Japan or Germany or the States, physics based companies for example, feel that they might want to come here.

33. Industrial R&D is mainly geared to development which is to be taken very close to the market so you know what targets you are trying to aim at. How can government supplement that which is principally driven by commercial considerations?

(*Dr Cotgreave*) It is not a question of the Government supplementing that. The main output of the science base for those industries is highly skilled, well trained people. You do not get those in a poorly funded science base. You do not get students with first degrees or masters or PhDs who are any good, who are any use to industry, if they are working on clapped out equipment which is 20 years old. You only get them in a well funded university where the lecturers are high quality and enthusiastic and where the equipment they have to work with is of the highest quality and up-to-date.

34. I do not understand that answer. If the Government put more money into the science base to generate more high quality scientists and technologists which are available to industry, and industry is not spending or its spending is in decline, where are they going to go?

(*Dr Cotgreave*) They are going to go and work for those same industries in the States and Japan and Germany and they are going to make the money and we are not.

35. That is going to be very generous of us to generate those people out of the science base to go to Japan and Germany.

(*Dr Cotgreave*) If we generated enough high quality people so that we could guarantee there was a good supply of those people coming through our science base, then those companies would come here. Some companies would locate here to use our science base. I know that is true because industrialists have told me that they keep a weather eye on the numbers and quality of people being turned out of the science bases in those other countries when they are making decisions about where to make new investment.

(*Professor Saunders*) This all sounds a bit like a counsel of despair to me. You are saying if the science base were to do well and the R&D section were to do badly, then the thing to do would be to cut off the bit which is doing well. It seems to me that what we are saying is that keeping a good strong science base stronger than it is now is very important. The other important thing which governments have to do and which is certainly part of SBS policy, is to make sure there is more likelihood of companies doing their bit as well. If two legs are not working equally, you do not weaken the stronger one.

Mr Beard: That was not my question. I entirely agree with what you are saying there. My question was whether governments can compensate for the inadequacies of spending in the industrial sector.

Mrs Curtis-Thomas

36. How important is it that each individual department maintains its own portfolio of R&D activity, rather than concentrating all or most R&D activities under the jurisdictions of one or two departments?

(*Professor Saunders*) It seems to me it would be only natural for departments to maintain their own portfolio. Since one of the major functions is to inform policymaking surely the link has to be with the department primarily.

37. Is there no argument, then, in drawing budgets away and then reallocating budgets on a need basis?

(*Professor Saunders*) As we said, that was not the proposal we were thinking of. In the discussion with Dr Turner, the advantages of the other were put forward.

38. To what extent has the decline in departmental expenditure on research and development had a visible impact on the ability of departments to develop sustainable evidence based policy and to make appropriate procurement decisions? Can you give me any examples in your response?

(*Professor Saunders*) The example which has already been discussed is MAFF.

39. Just MAFF?

(*Professor Saunders*) I do not know how many you want. In the case of MAFF it was fairly clear. A lot of us find that with things like BSE, GMOs and so on going on it seems very odd that they should (a) be cutting the research; and (b) I see no evidence which says they are coming up with really good work having cut their research budget. We have not been getting good advice.

40. Are you saying that what has happened at MAFF is indicative of what is happening in other departments?

(*Professor Saunders*) It is the best known example. It is rather hard for those of us outside departments sometimes to see in detail what is happening, but that one is clear.

41. Can you not think of other examples in other departments where you think that R&D expenditure is directly linked to an ability to make effective policy?

(*Dr Cotgreave*) The point is that you do not know whether it is being effective until you have a problem and the point about MAFF is that we happen to have had some serious problems with listeria in cheese, salmonella in eggs, TB in badgers; you name it we have had it over the last few years. It is particularly obvious. We will not really know whether the cuts over the next few years in the Department of the Environment, Transport and the Regions are going

[Mrs Curtis-Thomas *Cont*]
to be a problem until we have a problem in that department which we are unable to answer, when Oxford becomes gridlocked or something.

Dr Gibson

42. Has DTI's funding strategy failed British industry, do you think? Have they let us down on R&D?
(*Dr Cotgreave*) Yes, over a period of 20 years now the R&D strategy of the DTI has been simply to cut, cut and cut. If you add up all of the things which may not now be classified as DTI but were DTI responsibility, including things like the UK Atomic Energy Authority, then over the 20 years to about last year in real terms the investment went from something like £1 billion to something like about £200 million, a cut of four fifths. That cannot have been particularly helpful to British industry.

43. In the world you fight for what DTI should be doing in terms of building industrial support. Where should it be putting its priorities and its efforts? New technologies, etc?
(*Dr Cotgreave*) We all now believe, rightly or wrongly, that small and medium-sized enterprises are going to be an increasingly important part of the future economy. Small and medium-sized enterprises have a problem, which is that they are not awash with resources in terms of money or in terms of time to go looking at a plethora of different schemes which are around or linking up between them.

44. Do you back your winners now? Do you back things which are winning now and not prospective winners?
(*Dr Cotgreave*) You certainly back the winners now, but you also have to keep your eye on the prospective winners because if all you do is back the winners now, then in five or ten years' time, those prospective winners will no longer be there and there will be no winners to back.

45. What do DTI know about all that? How do they see that? What kind of world do they live in, in a windowed building somewhere in London? How do they know what is going on?
(*Dr Cotgreave*) I am afraid I am not the person to ask what goes on in DTI.

46. You must have a view on it, surely. SBS must have a view on that—off the record of course.
(*Dr Cotgreave*) As you well know, Dr Gibson, we are not currently off the record. It is interesting that in the science and innovation consultation paper which is doing the rounds at the moment, there is talk of a small business service. I think, depending on how it is funded, that would be an interesting development.

47. You really think DTI is all over the shop, do you not? They do not have a clue where they are going. That is what you really think.
(*Dr Cotgreave*) You are trying very hard to make me say something which you are going to use against the Science Minister in a couple of weeks' time. Their innovation consultation paper, which suggests reviewing the plethora of small schemes and bringing them together is an interesting development.

48. What do you think about short-term grants? Everybody has rabbited on about short-term grants for a long period now and their unsafe and insecure conditions. Surely it is good to focus the mind for three years, the lights are always burning day and night, over the weekend and so on, get results, push it through? What would you say to that, because we still have a strong science base despite all that for years now; it is not a new phenomenon?
(*Dr Cotgreave*) What I would say to that is that you may have noticed that I have left the science base and now do something else. I personally found being on constant short-term contracts utterly miserable, deeply stressful and not the way that I think the people who are going to generate the ideas that will turn into wealth for this country should be treated. To treat them like that I think personally is appalling. I also think that it has very little to do with a proper analysis of how science works. Many scientific projects are long-term projects. If like me you happen to be an ecologist, and if you happen to study species of animals or plants where the generation time is 25 years, then there is not much point in having a grant which lasts for three years. Clearly that sort of research should be funded maybe at a lower level but for a longer timescale. It does not seem to me that three years, which is a number pulled out of somebody's hat, is necessarily the one size which fits all answer to matters.

49. So you are in charge of the MAFF budget for one day—or three days if you are lucky. What would you do to alleviate this problem you have just delineated? How would you handle that? How would you set up a programme to get rid of it?
(*Dr Cotgreave*) To get rid of which particular problem?

50. The three-year, short-term contract.
(*Dr Cotgreave*) I am in charge of which budget?

51. You can have MAFF for three days.
(*Dr Cotgreave*) Cheers.

52. If you want another one, take it. Take MAFF to start with.
(*Dr Cotgreave*) What one needs to do is look at identifying on more of a case-by-case basis which particular pieces of research need to be looked at in the long-term. Something like BSE for example or GMOs need long-term study. We will not know the answer to questions about the effect of GMOs on the environment for a long time. You cannot know those effects.

53. It is interesting that you are talking about past experience, BSE and GMOs. How would you predict and have a strategy for future policy? How would you know what is going to be the hot shot subject in the next two or three years?
(*Dr Cotgreave*) I am talking about GMOs specifically because the environmental impacts of those are not known and they are what is going on at the moment and they are what is going to be coming up over the next few years. I am predicting that it will take a long time to answer some of those questions.

54. But research is being funded in that arena now.
(*Dr Cotgreave*) It is but there is no long-term guarantee that it will continue to be funded because of the short-term arrangements. What I would do, in

[Dr Gibson *Cont*]

answer to your question, is look for those areas where it is frankly in my view rather easy to predict that the questions are long-term questions and certainly say those ones have not got to keep coming back with their begging bowl every year or every three years; they will be funded in the longer term. Of course even you, even I, would fail to predict all of those but that would be a more coherent strategy than having constant short-term funding.

Mrs Curtis-Thomas

55. I understand that you welcomed the report Forward Look. However you have some concerns or misgivings about some of those statistics. Do you want to talk to us about that?

(*Dr Cotgreave*) I had a particular misgiving about the graph on page v, which purported to show that government investment in science and technology will be higher in two years' time than it has been at any time in the decade. That is true; that is not a misrepresentation in the sense of a factual inaccuracy. However, it is true that if one had chosen to extend the graph backwards one further year it would no longer be true that two years' time would be the highest point on the graph. It was essentially an arbitrary decision, it seems to me, to choose 1990 or 1991, whichever one it was that was chosen, merely in order to make the final outcome of two years' time look better than it would look if you extended the graph back further. If it is the case that all future editions of Forward Look will have a nine or ten-year graph on page v, and that has now been decided on as standard, then I would of course withdraw any objection. I have seen no evidence that that is the case and, call me cynical, but I suspect that it might not be.

56. I presume that you have made your views known in writing. I do not know that and I have not seen any of that documentation but I presume you have put that point forward.

(*Dr Cotgreave*) I believe we may have done; I could not swear that we have done that. It is in here at any rate so it will be published. No, I could not swear that we had written on that specific point.

Chairman

57. Could you check that out and let us know?

(*Dr Cotgreave*) I could check on that and let you know.

58. If you have written, could you send us a copy? If you have not written, please let us know that you have not.

(*Dr Cotgreave*) Yes, I can do that.

59. Three quick questions on the Office of Science and Technology's role in coordination. First of all, may I ask you whether you believe the role of coordination which exists with the Office of Science and Technology of science research and development and spending in those areas overall could be strengthened? Is there a greater role that the Office of Science and Technology could take in coordinating science research?

(*Dr Cotgreave*) Yes, I think our proposal—

60. I mean principally, of course, departmental science research obviously, not university.

(*Dr Cotgreave*) Our proposal for a Ministry for Science with a Cabinet Minister for Science speaks very clearly to our answer to that question which is yes, there is a role for greater coordination and I know that Professor Saunders has a particular point he wishes to make.

(*Professor Saunders*) One of the things which concerns us is that a lot of the science base actually comes under the DfEE because the DfEE is charged with the universities but science does not appear to be as high a priority with DfEE as we should like. If there were a stronger coordinating role, we hope the DfEE would be influenced by it and the position would therefore improve.

61. I was going to ask whether you think the Chief Scientific Adviser has sufficient authority. Perhaps the fact that you would like to see a Cabinet Minister coordinating gives me the answer to my question already.

(*Dr Cotgreave*) I do not think the Chief Scientific Adviser has sufficient authority and I think that a great shame in the case of the current incumbent who is an extremely able man.

Mr Beard

62. The Government have said that, in future, departments should have departmental science strategies with goals and measurable objectives. How much do you think that is going to help the Office of Science and Technology and the Chief Scientific Adviser to monitor and coordinate government policy across all departments?

(*Dr Cotgreave*) It is a very positive development. As we put in our document, the reason the Minister of Agriculture gave us for reducing his research investment was that he had had a difficult time in the comprehensive spending review and he had had to find savings across his budget. It would be much more difficult for that to happen—it would strengthen the hand for example of the Chief Scientist of MAFF—to have in place a strategy which had been agreed across government, that there were areas which needed more research or whatever, there was a strategy in place that needed effective funding to fulfil its objectives. That is a very positive development.

Dr Turner

63. Do you think that the Ministerial Science Group which was set up a year ago has actually produced any measurable impact on coordination of government research efforts?

(*Dr Cotgreave*) I think it is too soon to say.

(*Professor Saunders*) I would have been a little bit weaker on that than you were in fact.

Dr Gibson

64. At what point do you think you will be able to say?

(*Dr Cotgreave*) When the results of the current spending review are published.

[**Dr Gibson** *Cont*]

Chairman: When is that?

Dr Gibson: April/May.

Chairman: That is not the brightest note to finish on, but finish we must. May I conclude by thanking you both once again for coming before the Committee. We expect a letter from you in due course, Dr Cotgreave, and I am sure that if we have any other questions we want to put to you in writing, you will show your usual good nature and respond to our questions in due course. We should be grateful if you would. Professor Saunders, thank you for your backup; we may also have a dialogue with you in the future and we thank you in anticipation for the help we know you will give us. Thank you gentlemen, very much.

DR DAVID SHANNON, Chief Scientist, and DR ANTHONY BURNE, Head of Research Policy and International Division, Ministry of Agriculture, Fisheries and Food, were examined.

Chairman

65. Thank you very much indeed for coming along and being with us this afternoon from the Ministry of Agriculture, Fisheries and Food. I notice that you did enter the public gallery a little earlier and you will have heard your department being talked about to some extent. We should like to continue asking questions about the Ministry of Agriculture, Fisheries and Food. Why did we select your department rather than others? We know that there is a lot of science in your department. We also know there has been a dramatic cutback in science expenditure in your department and we also know that your department, more than any other, has had problems and difficulties of a severe nature over the last few years that can be seen to have a science linkage. That is why we have chosen you. It is a mixed blessing I am sure to be chosen in this way. May I ask you briefly to introduce yourselves to the Committee before we start questions?

(*Dr Shannon*) Good afternoon, I am David Shannon, Chief Scientist in the Ministry of Agriculture, Fisheries and Food. Perhaps I should say the four things I am responsible for. I am responsible for advice to Ministers and senior officials on scientific matters, particularly those of a strategic nature, responsible for the balance scope and quality of the research programme, responsible for policy on international relations in relation to the sciences with which MAFF is involved, principally the European Union but more widely than that internationally. Also for the policy on plant genetic resources.

(*Dr Burne*) Tony Burne. I also work in the Chief Scientist's group directly for David Shannon. My particular areas of responsibility are research policy, which involves a good deal of liaison with OST and the Cabinet Office, for the commissioning, controlling, contracting of the research process in MAFF involving a large number of contracts and our total spend and for a range of cross-cutting issues such as intellectual property. We also have a sponsorship role for MAFF's two largest non-departmental public bodies which are Kew Gardens and Horticulture Research International. We are involved in the governance, membership, finance, control and other issues of that sort. A fairly widespread portfolio working for David Shannon.

Dr Gibson

66. How much is involved in Kew Gardens?

(*Dr Burne*) We provide a grant in aid to Kew Gardens of about £16 or £17 million a year which provides for all of their scientific endeavour, their staff, their salaries and a fair amount of their capital expenditure.

Chairman

67. Does that come out of your science budget or out of your general budget?

(*Dr Burne*) That comes out of the science budget generally.

68. If the science budget is £25 million let us say, £16 million of that is going to growing trees in Kew Gardens?

(*Dr Burne*) It is a much smaller percentage than that obviously. Our total spend as reported in the Forward Look figures is more than our R&D budget which is about £125 million. The Kew element is about £16 to £17 million annually.

Chairman: So that is 12 per cent or so.

Dr Gibson

69. What about the Horticulture Research International? Is that about the same?

(*Dr Burne*) It is a different relationship with Horticulture Research International. We sponsor them; but we do not grant aid them. We spend a figure currently of about £11 million annually for R&D projects which they win either competitively or through commission arrangements.

(*Dr Shannon*) The research budget is about £125 million and the Kew funding is in addition to that.

Chairman

70. That makes it an even smaller percentage. It makes it closer to 10 per cent then.

(*Dr Shannon*) Yes.

71. I did not realise Kew was part of your responsibility. When you see science figures for MAFF—now they are a high figure it makes it 10 per cent—but if it had been half that it would be a percentage which was significant and would give a misleading indication of the amount of science which was available for research and development in the more accepted sense of the word.

[Chairman *Cont*]

(*Dr Shannon*) I should perhaps add that we do not treat all elements of research in the same way. Our responsibilities for Kew come from the trust under which Kew was set up and the research in Kew is an obligation under that, whereas the R&D budget is directly related to MAFF's policy interests. The main R&D budget—

Chairman: You get more reassuring with everything you say!

Mr Beard

72. Does that not mean Kew is ringfenced so you cannot touch it and you can touch the rest?

(*Dr Shannon*) Yes, it is. It is considered in a ringfenced way but obviously the Ministry's whole budget at some point is open for discussion with Ministers.

Chairman

73. Can you tell us how the annual level of R&D expenditure in your department is determined and how you allocate that to the various departments and policy areas and interests within the Ministry of Agriculture, Fisheries and Food?

(*Dr Shannon*) The traditional system has been to make bids for research and I would sit down annually with policy customers, talk to them about what their research needs were, go round all the policy groups within MAFF and pull together a bid for MAFF research noting what research was coming to an end, what new requirements they identified, any other indications which had come from committees such as SEAC or Food Advisory Committee or whatever. I then pull those bids together into a paper which will be put to the MAFF R&D committee, which is chaired by the Permanent Secretary and which then takes a view on the overall balance of the programme. Having taken a view the paper would then be put to the Minister for his agreement to the actual balance of expenditure for the next year.

74. Now you have answered the second part of my question about the balance. The first part of my question was how is the amount determined in the first place?

(*Dr Shannon*) The R&D bid of course has to be made to the Treasury along with all the other bids which MAFF is making and Ministers have to take a decision on what they are going to bid for and how much of each.

75. You could put in a bid for urgent research and development which could have prevented BSE, could have controlled listeria and e.coli and the Treasury could say you can only have one third of it?

(*Dr Shannon*) The R&D budget, as indeed all departmental budgets are, is in the control of Ministers and the Treasury.

76. When you have made a submission have you had it very severely cut back by the Treasury and only had a portion of what you have been asking for?

(*Dr Shannon*) There is a constant exchange between departments and the Treasury, usually departments wanting more resources than the Treasury is willing to provide.

77. Is that a yes or a no?

(*Dr Shannon*) Yes, most bids get cut back.

78. Severely in your case?

(*Dr Shannon*) Agricultural research particularly has been under significant reduction over the years. It depends how you define severe. The R&D budget was cut by a total of £13 million in the recent CSR 1999–2000 to 2001–02 which in real terms amounts to about 10 or 12 per cent, so it was quite significant.

79. We have figures here which show that between 1986 and 1997 MAFF's expenditure on R&D has declined by 26 per cent.

(*Dr Shannon*) Yes, that is correct.

80. During that time of a decline of 26 per cent in your R&D your department has been the department which has overseen an industry with an appalling record of BSE, e.coli, listeria, tuberculosis, salmonella. Is there any linkage between this massive cutback of 26 per cent in your science budget and all the problems you have had? Why, when there have been all these problems—they did not all come on the same day, it has been a sequence of problems in your department—has there not been greater pressure for more money for science to stop some of these things happening before they do?

(*Dr Shannon*) There has been a decline in the budget of something like 30 per cent over the last 15 years. At the same time, monies have been redirected into BSE. The BSE programme rose from a figure of £½ million in 1988 to £15 million today.

Mr Beard: As an emergency measure when the crisis had happened.

Chairman

81. This is paying for an expensive stable door when the first stable door was made of straw. What would have happened if there had been a bit more expenditure on the first stable door?

(*Dr Shannon*) That is not a fair statement in relation to BSE. I was involved with the Research Councils when they were looking at the issue of what was then called slow virus research in the late 1980s and the general science consensus was that the science community should not put more resources into scrapie and TSEs. The R&D budget was built up in response to the problem which was arising with BSE during the late 1980s and throughout the 1990s.

Mr Beard

82. You say the scientific consensus was as you say. But indeed for three or four years before 1988 there had been substantial talk about BSE and the capacity of the scrapie condition to cross the species barrier. There had been evidence of it in cats as well as in deer and in cattle. Why was the scientific viewpoint adopted by the department that complacent?

(*Dr Shannon*) If I might say so, you are not quite correct on the evidence. Obviously the BSE inquiry has teased out all the evidence going back quite a long way. I do not think before BSE was discovered there was any suggestion that scrapie could cross the species barrier and indeed had not apparently done so for 200 years while cattle and sheep had grazed contentedly in the same fields.

Chairman

83. We shall leave that for now. We are not the Agriculture Committee, we are the Science and Technology Committee. We do have some concern—maybe you do too in your reflective quiet moments—that if there had not been such a big decline in the expenditure on science R&D in your department maybe some of the calamities which happened may not have done so. I am not asking that as a question because I think it is one you would not want to answer. It is something which we reflect upon from time to time. What will the impact and the creation of the Foods Standards Agency have on future investment in R&D within the agricultural sector and how much of MAFF's R&D budget will be transferred to that agency?

(*Dr Shannon*) We shall be transferring about £20 million for food safety research and part of the BSE/TSE research, that part which relates to human health. That has already been transferred to the Agency and it will be responsible for that budget entirely from the point when the Agency is set up.

Dr Gibson

84. Does that include GMOs?

(*Dr Shannon*) It includes the food safety aspects of GMOs; it does not include the environmental aspects of GMOs which are still a MAFF/DETR responsibility.

Mr Beard

85. The Chairman has outlined the various conditions we all know about which might well have prompted an increase or at least a stop in the decline in research and development but we are now faced with an industry, the farming industry, which is in crisis, a crisis such as it has not experienced before, which the Prime Minister was talking about yesterday. Normally you would expect therefore that the department would be trying to help find new solutions to the crisis in the farming industry and look at the different problems and see whether there are things which could be done to help farmers of whatever description. Yet we are seeing the budget in MAFF continuing to decline. It is going to decline to £127 million in the year 2001–02. Given the fact that the farming industry has no other way than through the MAFF budget of developing new processes, examining problems, looking at issues, there is no other means of doing that except through your budget, is this not a scandalous position for the department to be in where you have a crisis which is unsurpassed and yet you continue to cut the budget which could possibly generate new ideas to help find some of the solutions?

(*Dr Shannon*) We are, of course, sensitive to the issue you are mentioning. We do still fund a substantial amount of research, £120 million; it will be £100 million when the Foods Standards Agency moves away. We do work closely with the industry, particularly through the industry levy bodies, working closely with them, to help them develop their programmes and indeed we have a number of jointly funded programmes with the industry. I did notice the Prime Minister yesterday talking about a long-term strategy for agriculture. I obviously welcome that and I did offer last night to work closely with the National Farmers' Union to give whatever help we could to help them develop that long-term strategy if they decided to take up the Prime Minister's offer.

86. You refer to the resources going into it: £120 million. Put that alongside the subsidy of £3.5 billion which is going into the farming industry. It pales into insignificance. I am not suggesting it is in any way your personal fault, but why is the department so purblind that it does not see a way out of some of the difficulties down this route of new developments?

(*Dr Shannon*) You are referring to the overall picture in relation to agriculture and apart from the department, the Treasury and perhaps some in government would take the view that the agricultural industry was having very substantial payments through CAP payments and through R&D and I suspect there has been a tendency to say the Government wishes to reduce the input overall to agriculture and R&D has been one of the routes by which it has been able to do that.

87. You are chopping off the growth shoots. This is the sole source of a potential solution rather than keeping on pouring all these funds into the industry.

(*Dr Shannon*) Yes, it certainly is.

Chairman

88. Is it not an indication that government does not really understand or appreciate what science can do? It is just a bit of a luxury which is there to be cut out as soon as times get hard.

(*Dr Shannon*) I would hate to defend governments, but governments do have to look at priorities and obviously—

89.—science is a low priority.

(*Dr Shannon*)—health and education are key priorities. I suspect other interests in government have had to suffer to sustain those priorities.

90. There is nothing more important so far as health is concerned than safe food, is there?

(*Dr Shannon*) Exactly.

Mr Beard

91. It does seem that the BSE crisis revealed a terrible shortsightedness in the Ministry in the past. Now it appears nothing has been learned because we are continuing the shortsightedness in the face of a crisis in the industry which, if anything has been learned, ought to have meant an increase in R&D spending.

(*Dr Shannon*) We do keep making the case to our political masters and I have to abide by the solutions which my political masters provide.

Chairman: We have had a go at the messenger for long enough, if I may say so.

Dr Gibson

92. The fulcrum of research has shifted into the Foods Standards Agency has it not? Is that not the political message? Have you not got that?

(*Dr Shannon*) £20 million of the budget is switching to the Foods Standards Agency.

93. And more to follow presumably.

(*Dr Shannon*) £100 million of the budget will still be concerned with animal health, with coastal protection, with animal welfare, agriculture in general, the environment. About 40 per cent of the current budget is spent on public health issues, 30 per cent is spent on competitive agriculture, including the control of animal disease and about 20 per cent is spent on the environment and a number of other smaller budgets on fish stock assessment and so on.

Dr Turner

94. I shall stay with short-termism for the moment. MAFF commissions a lot of research work from BBSRC research institutes and they argue that MAFF's changing priorities make it very difficult for them to plan strategically and make sure that they have the scientific expertise and capacity which is needed to do the work which you commission as you commission it. Do you think that you have any obligation as a research commissioner to think of the effect of your commission pattern on the wider parts of the science base?

(*Dr Shannon*) Yes, of course we do. Let me try to answer that. We start out by having a contractual basis with the research councils and our policy is that we will not break a contract, in other words if we have promised money for a particular project we will not break a contract even if our budget is being adjusted. We also try to give as much warning as possible to our contractors as to changes which may be coming around in the research programme. I suspect we will get round to discussing research strategies at some point. We have published our strategy for a number of years now, so there is a strategy on the table so that people can see what way the Ministry is thinking and how its research programmes are likely to develop forward. One other point against that is that of course priorities do change. We cannot be sympathetic in the extreme. We do have to change the programme as new requirements come up. I sit on the BBSRC Council and we do try to spell out our programmes as far as we can in advance. There is a compromise which needs to be made between having to change programmes and to provide some continuity.

(*Dr Burne*) We are particularly sensitive to our changing priorities and the impact these might have on research contractors in terms of their own investments in long-term planning and their research and skills base and the need for them to balance internal income from government versus external income from elsewhere. We do try to give as much notice as we can. We have been giving some thought to the idea of developing a rather longer term funding model where we can foresee clear and determined needs from our research contractors over a rather longer period than three years, which is the norm. That is something which is not completed yet, but it is something we have been thinking about quite hard recently.

95. I am glad you said that because I was about to pass on to BBSRC's suggestion that you should identify key facilities and unique scientific expertise in institutes which are core to your activities and agree some stability in the funding approach. You are working towards that. Can you enlarge on it, please, and say how you can make that fit with the circumstances in which you have to work?

(*Dr Burne*) It is a difficult issue to resolve because there is this inevitable tension which is created where one is both trying to put work to competition, trying to cope with changing priorities in the overall research programme. Because of the priority we give to key areas such as BSEs and badgers and so on, there is inevitably pressure in a declining total fund on other bits of the programme. It is difficult to juggle all these. It is difficult also for us to work out on a permanent ten-year basis all those key skills and core facilities we need from the particular contractor, including our own agencies—and we own three—against the wider changing picture of science needs. It is a difficult equation to balance and obviously, from the Government's point of view, we are looking for a degree of flexibility from the agencies or from our contractors. Their point of view is that they would like us to make a 100 per cent commitment to all the facilities they have.

(*Dr Shannon*) We carried out a study of what we deemed were key facilities and core skills. They amount to about 30 per cent of the research budget which we considered was associated with those two particular aspects. About half of that is in MAFF's own in-house agencies and about half is external. I suspect one of the problems is that we and BBSRC or institutes generally do not always agree on what are core skills and core facilities. I should say that one of the attributes of my policy colleagues is that if they believe there is a facility which is key to their future policies, they protect it very assiduously. There is a question of developing a model which might provide some firmer basis for the areas where we do think there are key skills and key facilities, but I suspect there are always going to be differences of opinion between a customer who has an agenda which is moving forward and a research institute with perhaps fairly static teams.

96. So we are beginning to see why you do not have such a straightforward agreement so far. To what extent has this been exacerbated by the reduction in your department's R&D budget?

(*Dr Shannon*) Inevitably we have less money to spend. We are placing fewer new contracts; we are also having to meet new requirements out of the existing base line. The resource is transferring to other players. I should say that there is another issue in that probably the MAFF research programme has switched from being highly agricultural to being concerned about the environment, concerned about animal welfare, concerned about human health issues, the money we are transferring to the Foods Standards Agency, and some of the existing research council institutes were not well prepared to deal with those. For example, substantial amounts of money from the food safety budget went into London

[Dr Turner *Cont*]
hospitals. The changing priorities and if you like a rather static research institute base, or a changing institute base but somewhat static one, is another problem.

97. It is not the end of BBSRC institutes' complaints. They seem to have a problem with bureaucracy or red tape in that there seem to be delays in project approvals, in processing reports, making payments in accordance with financial agreements and so on. What are you doing to streamline the administrative relationship between your department and the institutes?

(*Dr Shannon*) May I start somewhere slightly different in that when we involved policy customers much more on the research programme they immediately took quite an interest in the content of the research programme and wanted the programme tailored to meet the particular policy requirement, whether that is environmentally sensitive areas, whether it is nitrate leaching or whatever. All our contractors found a more particular customer than before so customers started to determine the content of the programme. Obviously that is still an issue. If you create customers, hopefully intelligent customers, they will want to control what is in their programmes. That has brought a degree of control over research council institute programmes which was not there previously. If you are going to give customers responsibility for budgets, you have to allow them to have a fair control of what that is being used for.

98. Do you think that the quality of output from MAFF sponsored research or your own in-house research would be improved by the introduction of peer review?

(*Dr Shannon*) We do use peer review on all the work we place by competition and that has been an increasing proportion of the budget. The quality of the research? We have a lot of good contractors in BBSRC institutes and we funded 60 per cent of Dolly, we funded John Pickett in his work on pesticide reduction strategies or strategies to improve the use of pesticides. Yes, we will use more peer review in future and that is an intention. I do not think that necessarily has prevented us funding some very significant pieces of research.

Dr Turner: Which end of Dolly do you claim?

Dr Gibson

99. Are you put under pressure to fund contract work in your own institutions?

(*Dr Shannon*) Not in the sense that the cuts in the budget have been visited on MAFF agencies as fully as they have been on other research institutes. If you own an organisation there is of course the financial problem at the end that you have to fund redundancies. There has not been a disproportionate visiting of cuts on particular institutions either institutes or agencies.

100. Do you feel you are out of line with other departments in that sense of funding your institutes in terms of the total money?

(*Dr Shannon*) That question needs careful answer. DETR for example does not have any agencies and puts all its work out to competition. I do not know how my institute colleagues would feel if that were the case with MAFF.

101. How do you feel about that?

(*Dr Shannon*) One has to think carefully about it because when we fund research we obviously want the research results but we quite often also want expertise, we want scientific advice, so that there is a package of work which we want. The other primary difference between MAFF and a number of other departments is that we are key users of our own research. If you look at DTI, to take an example, DTI does not actually use the research it funds, whereas MAFF when it funds animal health research is the primary developer of animal health policies so it is the primary user. Similarly in the environment where we are developing agri-environment schemes or whatever, quite often MAFF is using its own research. I assume DETR similarly is using its research.

102. Are you put under a lot of pressure to ensure that your institutes generate their own money? You mentioned Roslin, which in a sense is a success story. What about some of the other institutes? Are you told to get at them and make sure they earn value for money with the grants or do they just take the grant and exist? What do you do about that?

(*Dr Shannon*) There has been pressure on all institutes and agencies to generate external income to perhaps replace falling income from government sources.

103. How successful are your institutes at that? You mentioned Roslin, but that is very deliberate I am sure. What about the others?

(*Dr Shannon*) I am trying to recall but certainly of the MAFF agencies CSL York has a very substantial and rising income from non-MAFF sources; it does a lot of work for other departments.

104. Is this all documented?

(*Dr Shannon*) Yes, it is documented.

105. Could I ask that the Committee see the documentation on the generation of income by these institutes?

(*Dr Shannon*) Yes; indeed.

Mr Beard

106. What is CSL?

(*Dr Shannon*) Central Science Laboratory, York.

Dr Gibson: It was moved from Norwich to York; under great pressure, I might add.

Mr Beard

107. It has been proposed by the Council for Science and Technology that each department shall prepare a science strategy. How will that affect your department? How will that be influential in your department?

(*Dr Shannon*) As I pointed out a little earlier, MAFF has had a research strategy since the early part of the 1990s. The one I was holding up covers the years from 1996 to 2000 and the Minister in June or

[**Mr Beard** *Cont*]

July announced that we would be embarking on drafting the strategy for 2001–05. That process is well advanced. We will be going to consultation on it after Ministers have seen the draft and we will be inviting comments from the academics, the research councils and the industry.

108. So that strategy has been in being for some years.

(*Dr Shannon*) This has been in being for four years and there were sectoral strategies in being before that which were available to industry or to research councils.

109. Did that strategy foresee a strategic decline in the amount of resource going into research and development?

(*Dr Shannon*) That is quite a difficult question in that when we had an annual public expenditure round, the budgets were changing annually or potentially changing annually; with a three-year comprehensive spending review then, theoretically at least, the budget should be predictable over that period.

Dr Gibson

110. Loads of pounds have passed through your department for research and development. What are the success stories?

(*Dr Shannon*) When the history of BSE comes to be written—and I heard a few comments earlier—in 10 or 15 years' time with the real benefit of hindsight, many of the programmes which MAFF has put in place to address the BSE question will be classical, will produce classical results and indeed I believe they will be in the veterinary textbooks as to how to deal with an epidemic of the sort that BSE is and a number of very classic experiments.

111. Which work? Are you talking about Chris Bostock's work?

(*Dr Shannon*) I am having difficulty.

112. That is why I am chasing you because I want to know the success stories. We want to be proud. Give us some armament.

(*Dr Shannon*) I do think the close juxtaposition of research and policy and in the BSE area was—

113. A success story? Come on. Surely.

(*Dr Shannon*)—research being used to develop policy in a way that has not necessarily always been the case.

Mr Beard

114. What influence do you expect the Government's Chief Scientific Adviser and the Office of Science and Technology to have on the development of MAFF science strategy?

(*Dr Shannon*) We do keep closely in touch with OST and indeed they are aware of our strategy. They are providing guidelines on what departmental strategies should cover and we are taking that on board.

115. What impact more specifically is the OST and the Chief Scientific Adviser likely to have other than providing guidelines for drawing up the document?

(*Dr Shannon*) The interaction between MAFF and OST occurs at a number of levels. My Permanent Secretary meets Bob May on occasions, we consult Bob May on quite a lot of issues, appointments and other sorts of issues. At a working level we work very closely with the OST staff. I suspect Bob May will run his eye over the strategy and no doubt will make his comments well known to MAFF.

116. To what extent and how does the Office of Science and Technology now influence your decisions on research and development and expenditure priorities in MAFF?

(*Dr Shannon*) The Chief Scientific Adviser will be commenting on the bids which all departments are making to the Treasury and will be part of the process of deciding on the overall spend on R&D in departments.

117. My question was about what impact it has on science and technology in MAFF, not the Treasury. The Office of Science and Technology and the Chief Scientific Adviser have a coordinating role for science across Whitehall and my question is: what impact has the Office of Science and Technology and the Chief Scientific Adviser had on that strategy for instance which you are holding?

(*Dr Shannon*) This strategy was drafted before OST was as prominent in taking a role and coordinating as it now is. I suspect the Chief Scientific Adviser will comment prominently on the new strategy we are drafting.

118. So the answer is none really. In the past the Office of Science and Technology and the Chief Scientific Adviser have had no impact on the science and technology strategy in the Ministry of Agriculture, Fisheries and Food.

(*Dr Shannon*) To say no influence would be wrong.

119. But I thought that was what you were just saying.

(*Dr Shannon*) Bob May has commented on a number of aspects of MAFF's research programme, on some of the BSE work, on the release of data. There are several specific points where he has had an input.

120. Some of these science correspondents behind here have commented as well. Are they not in the same category?

(*Dr Shannon*) You have to realise that Ministers are ultimately responsible for the budgets they have under their control and Ministers agree with Treasury what they are going to fund and what they are not going to fund. It is quite difficult for a third party to influence that in a direct way other than in an aggregated way.

121. To go back to my earlier question: what difference is it going to make in the future? Your last answer implies: not much.

(*Dr Shannon*) I have no doubt Professor May will comment on the bids from departments to Treasury in totality. He will no doubt review the outcomes of the SR2000 process and I have no doubt he will comment to the Prime Minister on what he thinks of the outcomes as far as science is concerned.

[**Mr Beard** *Cont*]

122. But if precedent is anything to go by, we cannot expect the Office of Science and Technology to act as a central watchdog avoiding BSE lapses in the future as has happened in the past.

(*Dr Shannon*) I did say that we operate at a number of levels. The Chief Scientific Adviser has a Chief Scientific Adviser's Committee where we meet four times a year and at those meetings we do try to identify issues which may well be important in the future. OST is made aware of the sorts of issues that departments are becoming concerned about and perhaps in relation to specific issues, for example on TSEs, Sir Robert May sits on the high level committee which is debating the relative priorities in relation to TSEs.

Chairman

123. Would I be right then in thinking that if the Chief Scientific Adviser, whoever he or she may be, wanted to influence something in MAFF, the only realistic way they could do so, is speak to the Prime Minister, hope the Prime Minister understands the issue; the Prime Minister would then speak to the Minister of Agriculture and something would get done. There is very little chance of the Chief Scientific Adviser influencing science in MAFF by going laterally across the system without going up and coming down again.

(*Dr Shannon*) No.

124. Everything you have said to Mr Beard so far indicates that is the case.

(*Dr Shannon*) Perhaps I am not identifying all the occasions when my Permanent Secretary has discussed issues with the Chief Scientific Adviser. He has seen the Chief Scientific Adviser as someone to be consulted on a range of issues.

125. Your previous answer was that the Minister runs his own department, the Minister does not really want any interference from anyone else in another department and therefore we draw the conclusion that the only way the Minister can be influenced on scientific matters is if the Prime Minister having listened to the Chief Scientific Adviser tells him to do something. We get the impression that science is a whole lot of little compartments so small in their own way that they do not have any meaningful weight and yet they are not prepared to come together to pool their resources, to talk to each other, unless there is a Prime Minister to bang heads together. That is the impression we are getting this afternoon.

(*Dr Shannon*) That is not a correct impression because we do talk with other departments. OST may or may not be involved. In a number of areas, for example on TSEs, MAFF, Department of Health and research councils produced a strategy on TSEs. One will increasingly see the development of trans-departmental strategies on particular issues, perhaps not across all of the programmes, but on issues which spread across departments: TSEs, OPs, one or two others, GM technology. Rather than try to create one grand database with all of the Government's R&D on it, there is a tendency for strategies in particular areas to be developed where the issue crosses a number of departments.

Mr Beard

126. You are the Chief Scientist in the Ministry of Agriculture, Fisheries and Food?

(*Dr Shannon*) Yes.

127. Why then is it the Permanent Under Secretary who discusses these matters with the Chief Scientific Adviser?

(*Dr Shannon*) I report to the Permanent Secretary and the Permanent Secretary talks to Sir Robert May who is at his level.

Mr Beard: But the Permanent Secretary has 1001 things on his mind. How is he going to represent some of the issues we have been covering this afternoon to Sir Robert May?

Dr Gibson: He is the boss of the department.

Mr Beard

128. That just means all these things are filtered through and rather than it being the science which is discussed, it is what is departmentally convenient.

(*Dr Shannon*) That is being unfair. My Permanent Secretary chairs the R&D Committee, I report to him, I see him monthly on issues relevant to R&D. He is a scientist by training, a chemist by training, so he is not averse to delving into scientific issues and he discusses them with Sir Robert May.

Chairman: This has been very interesting but we do not have all day to debate it.

Dr Turner

129. The impression is coming across that joined-up thinking has not spread as far into departments as some of us might like. May I come back to the question of liaison with other government departments, identifying areas of common research interest and research strategies and priorities? Do you really set out to do this and can you give us some good examples of where it is working and how effective it is or not?

(*Dr Shannon*) We have a funders' group. Agricultural departments, research councils, forestry commissions come together to try to coordinate their programmes and recently we published the second report of the Agriculture, Food and Fisheries Research Funders' Group, which does set out what each of the players is funding in a table—table 1. We do discuss whether there are any overlaps between us or whether gaps are developing in the programmes. So there is a forum which does actually look at the content of the programmes.

130. This does not sound as though it is operating across all government departments. This sounds a fairly narrowly based forum. I am certainly not sure that I am hearing that traditional civil service hierarchies and compartmentalisation is not standing in the way of progress.

(*Dr Shannon*) I suppose we are here dealing with agriculture, agri-environment and food and those are the bits which MAFF has to try to coordinate with the devolved departments and the research councils. Whether you could put all the chief scientists in a room together and say coordinate all your activities? One has to focus on the areas where there is potential for gaps to develop, the areas where there is potential

[**Dr Turner** *Cont*]
for overlaps. I should also say that all of our research programme is on the internet for anyone to look at, to examine, all our projects are there with start dates, end dates and the titles. In future we shall be putting information on all the reports from our research projects and the availability of those reports will be on the internet.

131. Do you look at other departmental websites to see where there may be relationships?

(*Dr Shannon*) I do; but I have a particular interest in doing so.

Chairman: We have run out of time. We do have a couple of questions still left. May we write to you with the remaining questions and perhaps you would be so kind as to give us a written response? It has not been an easy session for you but we do thank you very much indeed for your patience and fortitude and for finding time to come along this afternoon and assist us. The things you have had to tell us have been of very great interest in a variety of ways and we are grateful to you. Dr Burne, we thank you too for coming along and supporting Dr Shannon. Thank you both very much indeed.

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